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BUREAU OF MINES MINERALS YEARBOOK

The Mineral Industry of the United Arab Emirates

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This publication is a chapter from the current Bureau of Mines Minerals Yearbook, comprising *Volume I, Metals and Minerals; Volume II, Area Reports: Domestic; Volume III, Area Reports: International.* The separate volumes of the Yearbook are sold by the Superintendent of Documents, Washington, D.C. 20402.

The Mineral Industry of the United Arab Emirates

By Kevin Connor[1]

Despite a steady decline in oil export revenues since 1976, the petroleum sector continued to dominate the economy of the United Arab Emirates, with 1984 crude oil export receipts accounting for an estimated 35% of the country's gross domestic product (GDP). Revenues from the sale of natural gas liquids (NGL) accounted for another 5% of the GDP. As of 1984, the United Arab Emirates ranked 12th in world production of crude petroleum, 7th in proven petroleum reserves, 7th in processed natural gas production, and 15th in proven gas reserves. Other mineral products produced in the United Arab Emirates were cement, ammonia and urea fertilizer, and aluminum from imported bauxite.

Crude oil was first exported from Abu Dhabi in 1962 and Dubai in 1969. Since that time, the United Arab Emirates have had one of the fastest growing economies in the world, particularly following the sharp rise in petroleum prices in 1973. Government spending in the early to mid-1980's showed a downturn due to the general economic contraction caused by the worldwide oil surplus and subsequent depressed market prices. The contraction of the economy has not been a major setback, however, as major infrastructural necessities for the nation were largely completed by 1982. Despite the oil-related economic downturn, petroleum and gas revenues have continued to provide the bulk of national revenues to the United Arab Emirates. The per capita income in 1984 was $24,000, one of the highest in the world.[2]

PRODUCTION AND TRADE

Proven oil reserves sufficient to last over 70 years at current production levels ensure the United Arab Emirates long-term rank as a major producer. With the 1979 discovery of one of the world's largest natural gas fields under the offshore oilfield of Umm Shaif, natural gas processing should become an increasingly important aspect of the United Arab Emirates economy. Continued exploration is expected to add substantial quantities to known reserves of both oil and gas. During 1984, Abu Dhabi became an exporter of sulfur. The central gas complex at the Habshan Field was equipped to handle sour gas and during 1984 began producing 800 tons per day of pelletized sulfur. All of this product was slated for export, and a 40,000-ton storage facility had been built at Ruwais to house, reclaim, and transport the sulfur to ships. With construction completed on the 900,000-ton-per-year urea and ammonia fertilizer plant at Ruwais in November 1983, and plans well under way for a 500,000-ton-per-year urea and ammonia plant to be located at Sharjah, the fledging nitrogen-based fertilizer industry was expected to grow steadily along with the natural gas industry. Business activity surrounding the oil and gas industry was expected to continue to expand in the United Arab Emirates despite the present depressed state of the petroleum market.

Table 1.—United Arab Emirates: Production of mineral commodities[1]

Emirate[2] and commodity[3]	1980	1981	1982	1983[p]	1984[e]
ABU DHABI					
Cement, hydraulic thousand metric tons	e500	e700	e780	800	800
Gas, natural:					
Gross million cubic feet	508,445	472,508	410,009	NA	NA
Marketed do.	115,500	320,126	300,000	NA	NA
Natural gas liquids thousand 42-gallon barrels	32,200	e35,000	38,000	NA	NA
Petroleum:					
Crude do.	492,154	413,910	319,400	283,000	300,000
Refinery products:					
Gasoline do.	1,500	e6,000	13,000	20,000	20,000
Kerosine do.	400	e1,000	6,000	10,000	10,000
Distillate fuel oil do.	1,600	e6,500	10,000	25,000	25,000
Residual fuel oil do.	1,400	e5,600	7,000	10,000	10,000
Naphtha do.	100	e1,000	5,000	10,000	10,000
Refinery fuel and losses do.	500	e500	2,000	5,000	5,000
Total do.	5,500	e20,600	43,000	80,000	80,000
Sulfur: Byproduct from petroleum refining metric tons	--	e5,000	10,000	15,000	15,000
DUBAI					
Aluminum, primary ingot do.	25,000	e106,000	148,739	151,170	155,333
Cement, hydraulic thousand metric tons	500	e500	e350	800	800
Gas, natural:[e]					
Gross million cubic feet	142,000	146,000	140,000	150,000	150,000
Marketed do.	23,800	38,000	70,000	120,000	120,000
Natural gas liquids:					
Propane thousand 42-gallon barrels	1,500	e2,500	5,000	10,000	10,000
Butane do.	1,000	e1,100	3,000	8,000	8,000
Natural gasoline do.	1,000	e1,700	4,000	9,000	9,000
Petroleum, crude do.	127,818	130,889	e133,850	121,830	120,000
FUJAYRAH					
Cement, hydraulic thousand metric tons	--	--	--	520	550
RA'S AL-KHAYMAH					
Cement, hydraulic do.	500	e800	e750	1,200	1,200
Lime[e] do.	e44	40	40	45	45
SHARJAH					
Cement, hydraulic[e] do.	220	220	e188	685	700
Gas, natural:					
Gross[e] million cubic feet	6,600	20,000	30,000	40,000	40,000
Condensate thousand 42-gallon barrels	--	--	4,500	6,000	6,000
Petroleum, crude do.	3,586	3,540	e2,555	3,932	4,000

eEstimated. pPreliminary. NA Not available.

[1]Table includes data available through July 27, 1984.

[2]In addition to the Emirates listed, Ajman and Umm al-Qaywayn record no mineral production but presumably produce small quantities of crude construction materials.

[3]In addition to the commodities listed, crude construction materials such as common clays, stone, and sand and gravel presumably are produced, but output is not recorded quantitatively, and general information is inadequate to make reliable estimates of output levels. Limestone quarried for cement manufacture is substantial; however, information is inadequate to make accurate estimates of output levels.

[4]Reported figure.

Table 2.—United Arab Emirates: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	961	26,660	--	Iran 25,806; Pakistan 395.
Copper: Metal including alloys:				
Scrap	--	100	--	All to Kuwait.
Semimanufactures	210	119	--	United Kingdom 59; Qatar 54.
Iron and steel: Metal:				
Scrap	3,836	6,363	132	Pakistan 4,225; Qatar 1,487.
Pig iron, cast iron, related materials	118	NA		
Ferroalloys	4	--		
Steel, primary forms	--	40	--	All to Qatar.
Semimanufactures:				
Bars, rods, angles, shapes, sections	2,715	14,929	NA	Bahrain 4,769; Qatar 3,354; Iraq 3,098.
Universals, plates, sheets	3,404	2,650	NA	Saudi Arabia 1,601; Iraq 171.
Hoop and strip	1	1	--	All to Saudi Arabia.
Rails and accessories	21	13	--	Saudi Arabia 10; Qatar 2.
Wire	227	465	--	Netherlands 159; Yemen (Sanaa) 105; Qatar 72.
Tubes, pipes, fittings	5,541	9,074	37	Saudi Arabia 2,710; Bahrain 1,708; Iraq 1,701.
Lead: Metal including alloys, semimanufactures	--	3	--	All to Saudi Arabia.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$10	--	All to Switzerland.
Silver: Ore and concentrate do.	$81	--		
NONMETALS				
Cement	4,574	57,931	--	Qatar 49,075; Yemen (Aden) 4,772.
Chalk	36	--		
Clays, crude	25	38	--	Qatar 25; Pakistan 13.
Diamond: Gem, not set or strung value, thousands	$9,673	$4,753	$297	United Kingdom $1,898; Belgium-Luxembourg $1,825.
Fertilizer materials:				
Crude, n.e.s	1,264	686	--	All to Yemen (Aden).
Manufactured:				
Ammonia	22	13	--	All to Qatar.
Nitrogenous	2	--		
Unspecified and mixed	244	18	--	Saudi Arabia 11; Qatar 6.
Gypsum and plaster	266	19	--	Iraq 12; Qatar 7.
Lime	493	793	--	Kuwait 671; Saudi Arabia 67; Qatar 35.
Precious and semiprecious stones other than diamond: Natural value, thousands	$435	$1,582	--	United Kingdom $615; Hong Kong $590; Thailand $114.
Salt and brine	968	283	--	Qatar 244; Iran 35.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	97	10	--	All to Qatar.
Sulfate, manufactured	1,267	244	--	Iraq 150; Saudi Arabia 45; Qatar 36.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked value, thousands	--	$2	--	All to Bahrain.
Worked	430	698	--	Qatar 329; Saudi Arabia 237.
Dolomite, chiefly refractory-grade	125	--		
Gravel and crushed rock	26	121	--	All to Qatar.
Sand other than metal-bearing	1,248	1,272	--	Qatar 827; Saudi Arabia 297.
Sulfur:				
Elemental, crude including native and byproduct value, thousands	$1	--		
Sulfuric acid	83	9	--	All to Bahrain.
Other: Crude	--	20	--	Bahrain 15; Pakistan 5.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum:				
Crude thousand 42-gallon barrels	[2]525,236	431,252	12,155	Japan 152,497; France 20,914; Italy 13,031.
Refinery products:				
Liquefied petroleum gas value, thousands	$36	$5	--	Bahrain $2; Qatar $2.

See footnotes at end of table.

Table 2.—United Arab Emirates: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Gasoline, motor thousand 42-gallon barrels	51	NA		
Kerosine and jet fuel do	143	--		
Distillate fuel oil do	171	94	--	Oman 72; Qatar 20.
Lubricants do	34	(3)	--	
Bitumen and other residues do	1	1	--	Mainly to Qatar.
Bituminous mixtures value, thousands	--	$20,000	--	Egypt $10,000; Qatar $8,000.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Annual Statistical Bulletin 1982 published by Organization of Petroleum Exporting Countries, Vienna, Austria. Since this source only reports crude exports for Abu Dhabi, crude production by Dubai and Sharjah have been added to the totals because their production is believed to be wholly exported; however, their destinations are unavailable.
[3]Value only reported at $19,002,000; $9,913,000 was exported to Iraq and $6,206,000 to Saudi Arabia.

Table 3.—United Arab Emirates: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals value, thousands	$8	$77	--	France $76.
Aluminum:				
Ore and concentrate	9,013	--		
Oxides and hydroxides	187,028	304,984	--	Australia 304,887.
Metal including alloys:				
Scrap	340	1,117	28	Kuwait 468; Qatar 393; Saudi Arabia 111.
Semimanufactures	10,313	8,761	609	Belgium-Luxembourg 1,677; Bahrain 1,245; Italy 702.
Copper:				
Ore and concentrate	35	--		
Metal including alloys:				
Scrap	3,401	594	16	Saudi Arabia 296; Qatar 111; Netherlands 101.
Unwrought	19	31	--	United Kingdom 29.
Semimanufactures	5,338	4,862	253	United Kingdom 1,781; Japan 851; Republic of Korea 398.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	98,920	41,248	--	All from India.
Metal:				
Scrap	313	525	45	Kuwait 334; Bahrain 44; Saudi Arabia 32.
Pig iron, cast iron, related materials	1,347	1,340	2	Netherlands 1,318.
Ferroalloys:				
Ferromanganese	--	10	--	All from United Kingdom.
Unspecified	923	590	133	Norway 386; United Kingdom 48.
Steel, primary forms	616	11,265	--	West Germany 5,973; East Germany 1,998.
Semimanufactures:				
Bars, rods, angles, shapes	389,681	367,725	356	Japan 234,987; Qatar 78,501.
Universals, plates, sheets	112,926	104,694	527	Japan 70,656; West Germany 10,291.
Hoop and strip	715	817	21	West Germany 530; Italy 153.
Rails and accessories	342	242	--	United Kingdom 194; France 29.
Wire	29,148	20,725	4	China 4,379; Belgium-Luxembourg 4,294; Japan 4,106.
Tubes, pipes, fittings	334,484	357,332	21,057	Japan 133,310; West Germany 51,929; France 51,773.
Castings and forgings, rough	22	3	--	United Kingdom 2.

See footnotes at end of table.

Table 3.—United Arab Emirates: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
METALS —Continued				
Lead:				
Oxides	NA	18	--	All from Spain.
Metal including alloys:				
Unwrought	43	13	--	West Germany 10; United Kingdom 3.
Semimanufactures	108	67	1	West Germany 58; Japan 5.
Manganese: Oxides	--	21	21	
Mercury value, thousands	$3	$2	--	All from United Kingdom.
Nickel: Metal including alloys:				
Unwrought	16	--		
Semimanufactures	9	38	1	United Kingdom 34.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$929	$9	--	Sweden $6.
Silver:				
Ore and concentrate do	$274	--		
Waste and sweepings do	$48	--		
Metal including alloys, unwrought and partly wrought do	$16,406	$46,489	--	Singapore $15,944; Pakistan $10,896.
Tin:				
Oxides	7	--		
Metal including alloys:				
Unwrought	73	12	--	Mainly from Denmark.
Semimanufactures	841	29	--	Japan 18; Saudi Arabia 5.
Titanium: Oxides value, thousands	$995	$1,468	$457	West Germany $405; Spain $236.
Zinc:				
Ore and concentrate	--	17	17	
Blue powder	--	16	--	All from United Kingdom.
Metal including alloys:				
Unwrought	287	165	2	Spain 61; Netherlands 50; United Kingdom 28.
Semimanufactures	715	225	10	West Germany 62; United Kingdom 37; Bulgaria 25.
Other:				
Oxides and hydroxides	--	177	--	West Germany 62; Norway 54; Singapore 23.
Base metals including alloys, all forms value, thousands	$198	$714	$224	France $267; Norway $165.
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	20,844	18,854	42	Netherlands 18,190; India 607.
Grinding and polishing wheels and stones	902	1,026	26	Italy 722; United Kingdom 62.
Asbestos, crude	10,359	9,217	33	Republic of South Africa 4,080; Canada 3,049; Romania 1,000.
Barite and witherite	24,843	25,823	--	India 23,818.
Cement	857,209	478,747	--	Republic of Korea 232,869; Japan 148,844.
Chalk	2,364	2,256	--	Belgium-Luxembourg 2,010; United Kingdom 106.
Clays, crude	13,500	18,737	1,285	India 13,352; Singapore 2,124.
Diamond:				
Gem, not set or strung value, thousands	$12,827	$8,873	$472	Belgium-Luxembourg $4,583; India $3,151.
Industrial stones do	$8	--		
Fertilizer materials:				
Crude, n.e.s	21,563	49,265	--	Pakistan 48,720.
Manufactured:				
Ammonia	106	50	5	India 17; United Kingdom 11; Kuwait 7.
Nitrogenous	2,638	5,410	1	Belgium-Luxembourg 973; Kuwait 865; Netherlands 856.
Phosphatic	908	486	--	Belgium-Luxembourg 182; Qatar 150; Italy 89.
Potassic	--	41	--	All from Belgium-Luxembourg.
Unspecified and mixed	10,965	15,299	25	Denmark 6,338; Netherlands 5,921; Romania 1,682.
Graphite, natural	12	NA		
Gypsum and plaster	2,489	2,604	9	West Germany 610; Lebanon 419; Denmark 373.
Lime	1,244	1,729	--	Belgium-Luxembourg 1,529; France 50.
Magnesite value, thousands	$199	$83	--	Netherlands $43; China $33.

See footnotes at end of table.

Table 3.—United Arab Emirates: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Mica: Crude including splittings and waste	430	196	44	India 127; United Kingdom 17.
Pigments, mineral:				
Natural, crude	36	241	7	United Kingdom 122; India 83.
Iron oxides and hydroxides, processed value, thousands	$123	$583	$28	Japan $257; West Germany $213.
Precious and semiprecious stones other than diamond:				
Natural do.	$3,603	$1,779	--	United Kingdom $446; Sri Lanka $424; Thailand $354.
Synthetic do.	--	$29	--	All from India.
Salt and brine	20,777	27,486	242	Netherlands 9,108; China 6,422; India 1,855.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	2,039	3,122	10	West Germany 1,446; France 599; Romania 303.
Sulfate, manufactured	1,662	1,663	113	West Germany 658; Belgium-Luxembourg 394.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	8,391	8,818	662	Italy 7,118; India 629.
Worked	16,797	20,906	80	Italy 18,432; India 667.
Dolomite, chiefly refractory-grade	7,353	4,420	--	India 2,901; Norway 1,168.
Gravel and crushed rock	6,439	12,334	387	India 5,768; Jordan 4,432; France 1,036.
Limestone other than dimension	35	--	--	
Sand other than metal-bearing	11,837	5,629	370	Netherlands 1,518; Mozambique 1,013; India 845.
Sulfur:				
Elemental:				
Crude including native and byproduct	391	235	--	All from Bahrain.
Colloidal, precipitated, sublimed	295	NA		
Sulfuric acid	1,496	1,793	5	Kuwait 1,753; United Kingdom 30.
Talc, steatite, soapstone, pyrophyllite	--	515	96	Norway 403; Finland 14.
Other: Crude	4	7,122	33	Netherlands 2,867; West Germany 2,745; Belgium-Luxembourg 1,230.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	33	73	35	Netherlands 23; United Kingdom 15.
Carbon black	--	14	--	West Germany 7; United Kingdom 2.
Coal:				
Anthracite value, thousands	--	$6	--	Mainly from Lebanon.
Briquets of anthracite and bituminous coal	9	26	1	Syria 25.
Lignite including briquets	64	181	181	
Coke and semicoke	53	5	--	All from United Kingdom.
Peat including briquets and litter	--	149	--	Sweden 52; Netherlands 25; West Germany 19.
Petroleum:				
Crude value, thousands	--	$17	--	All from France.
Refinery products:				
Liquefied petroleum gas do.	$5,004	$813	$419	Saudi Arabia $129; United Kingdom $123; Belgium-Luxembourg $83.
Gasoline, motor thousand 42-gallon barrels	2,469	147	--	Mainly from Bahrain.
Mineral jelly and wax do.	1	(2)	(2)	
Kerosine and jet fuel do.	3,597	228	--	Kuwait 134; Bahrain 86.
Distillate fuel oil do.	8,350	4,051	--	Bahrain 1,740; Kuwait 1,727; France 221.
Lubricants value, thousands	$64,746	$44,927	$2,068	Australia $10,133; United Kingdom $8,040; Belgium-Luxembourg $7,033.
Nonlubricating oils thousand 42-gallon barrels	7	(2)	(2)	
Residual fuel oil do.	3,526	6,942	--	Kuwait 3,133; Bahrain 2,681.
Bitumen and other residues do.	1,264	913	6	Bahrain 727; Saudi Arabia 54.
Bituminous mixtures value, thousands	$29,828	$25,736	$339	Bahrain $18,104; Netherlands $3,098.
Petroleum coke do.	$12,357	$10,064	$10,015	Saudi Arabia $46.

NA Not available.

[1]Table prepared by Virginia A. Woodson.

[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

The Dubai Aluminium Co. (DUBAL) continued to increase production at its Jebel Ali plant in 1984, with an output for the year that was 15% above the plant's rated capacity of 135,000 tons. An equally if not more impressive aspect for the year was that production costs were decreased by approximately 11% from those of 1983. During 1984, the company exported a total of 150,389 tons of aluminum, of which 75% went to Japan, the United States, and Iran. An associated function of the plant was its desalinization plant, which supplied the city of Dubai with salt and almost 19 million gallons of drinking water. DUBAL was 100% owned by the Dubai Government.

NONMETALS

As of the end of December, the total installed cement clinker production capacity within the United Arab Emirates was 4.2 million tons per year, and the clinker grinding capacity was 8.7 million tons per year. Ajman Cement Co. began operating a new 750,000-ton-per-year clinker grinding plant at Ajman in May. Ube Industries Ltd. of Japan built the plant, and APCEM Engineering Ltd. was acting as a consultant and assisting with technical management operations. Construction of the new 300,000-ton-per-year white cement plant at Ra's al-Khaymah continued throughout 1984, with a commissioning date of November 1985 expected. The plant was being built by Hitachi Zosen Engineering and Construction Co. Ltd. of Japan. and APCEM Engineering was acting as consultant and assisting in technical management planning for the operation. The plant's expected white cement product was to be exported mainly to other Gulf countries. National Cement Co. continued work throughout the year on increasing the clinker grinding capacity at its Dubai plant, converting the existing wet process to a dry process. Expected grinding capacity should increase to 500,000 tons per year. Umm al-Qaywayn Cement Industries Co. finalized plans to build a 500,000-ton-per-year clinker grinding plant to be built and commissioned by the end of 1986. This was to be the first phase of a three-phase project, later phases of which would build an additional 500,000-ton-per-year clinker grinding plant and clinker production plant. The contract for the first phase was awarded to Hitachi Zosen of Japan. W. S. Atkins Group Consultants performed the feasibility study work for the project.[3]

MINERAL FUELS

Natural Gas.—Several major gas projects became operational during 1984. Chiyoda Chemical Engineering and Construction Co. of Japan finished its turnkey contract to build and initially operate the Ruwais Fertilizer Industries Co. Ltd. (FERTIL) Abu Dhabi plant complex, and officially turned the facility over to FERTIL company personnel at the end of August. FERTIL was owned 66.7% by Abu Dhabi National Oil Co. (ADNOC) and 33.3% by Compagnie Française des Pétroles (CFP) of France. The plant complex was designed to use feedstock gas from Abu Dhabi's onshore fields for fuel at the plant, as well for the manufacture of ammonia and urea, all for exportation. Construction of the plant, which was designed to produce 1,000 tons per day of ammonia and 1,500 tons per day of urea, was completed in November 1983. Contracts have been negotiated and finalized in 1984 with 225,000 tons of the plant's annual production destined for India, a progressive increase of up to 80,000 tons per year to China, and the balance of the annual production going to Japan. The latter two contracts were for periods of 7 years each.

The Emirates General Petroleum Corp. (EGPC) continued with the construction of a pipeline network to the northern Emirates power stations and industries, supplying natural gas produced from Amoco Sharjah Oil Co.'s Sajaa Field gas and condensate operation. Construction of the pipeline network, by Dodsal of Frankfurt, the Federal Republic of Germany, was begun in 1983, and was completed during 1984 to two Sharjah power stations at Layyah and Dhaid, supplying a total of up to 80 million cubic feet per day (mmcf/d) to the two plants. Construction of the network to connect power stations in Ra's al-Khaymah, Ajman, Fujayrah, and Umm al-Qaywayn was to continue in 1985. EGPC was 100% owned by the United Arab Emirates Federal Government.

Associated with and dependent upon the newly developed Sajaa Field in Sharjah, construction began in the latter half of the year on a liquefied petroleum gas (LPG) plant south of the field and a new ocean port at Hamriya to handle export products. The project, Sharjah Amoco Liquid Petroleum Gas Co., was expected to cost $300 million[4] upon completion, the target date for which was mid-1986. Ownership of the company was divided as follows: Sharjah

Government, 60%; Amoco Sharjah, 25%; Tokyo Boeki, 7.5%; and C. Itoh Co. Ltd., 7.5%. The principal construction contractor for the turnkey project, Japan Gasoline Co., began laying foundations for propane and butane tanks at Hamriya on October 27. Capacity and products expected from the completed facility were 13,000 barrels per day (bbl/d) of mixed LPG, 7,500 bbl/d of propane, and 6,000 bbl/d of butane. The plant was also expected to produce an additional 1,500 bbl/d of condensate. By yearend, development drilling and expansion of gas plant capacity had increased production from the Amoco International onshore Sajaa Field operation to 59,800 bbl/d of condensate, and 58 mmcf/d of natural gas. Amoco Sharjah drilled and plugged one exploratory well on its 590,000-acre concession during 1984 and had begun drilling a second exploratory well by yearend.

On-stream since April 1984, the Thamama gas-gathering and processing operation reached a peak capacity of 265 mmcf/d during August. The project was designed and construction-managed by Fluor Corp. Owned 100% by ADNOC, the operation consisted of 50 kilometers of sour gas-gathering trunk lines connecting 19 wells in the Bab Field to processing facilities located at Habshan. Products from Habshan included sweet gas, which was transported through existing gas lines to Ruwais and Abu Dhabi for use as fuel and feedstock in utilities and industries, NGL, stabilized condensate, and granulated sulfur. Abu Dhabi Co. for Onshore Oil Operations (ADCO) operated the gas-gathering section of the system for ADNOC. Expected peak production for 1985 was 350 mmcf/d. Design capacity of the facility was 450 mmcf/d of sour gas throughput, producing 375 mmcf/d of sweet gas, 4,500 bbl/d of NGL, 26,000 bbl/d of condensate, and 800 tons per day of sulfur.

The Margham Field gas-condensate development concession within Dubai was owned 66.67% by Arco Dubai Inc., a subsidiary of Atlantic Richfield Co., and 33.33% by British Petroleum Ltd. Discovered in 1982, 12 wells had been drilled to the Margham structure by yearend 1984, with more drilling planned for 1985. The gas-gathering and condensate recovery system was designed by Fluor, and constructed portions of the system were built by Dodsal, Mina Jebel Ali Construction Co., and CCC Wescon. During 1984, the produced gas was flared, while condensate was pumped via a 40-kilometer pipeline to Jebel Ali, where storage tanks and a loading terminal were located. Approximately 800,000 barrels of condensate were exported to Mitsui & Co. of Japan in November and December, with long-term contracts waiting on Mitsui's analysis and a final assessment of the condensate's quality. The 350 mmcf/d of gas being produced from the field was to be reinjected as soon as construction of the injection system was completed. The reinjection should optimize recovery of condensate.

Other projects ongoing during 1984 were expansions of existing systems for Abu Dhabi Gas Liquefaction Co. (ADGAS) and Abu Dhabi Gas Industries Ltd. (GASCO) of Abu Dhabi, and Dubai Natural Gas Co. (DUGAS) of Dubai. For ADGAS, CBI Constructors Ltd. was building three new liquefied natural gas and four new LPG storage tanks on Das Island, at an overall project cost of $550 million. In association with this construction, ADNOC was pressing ahead with development of the Khuff gas formation under the offshore Umm Shaif Oilfield. Four wells were completed into the Khuff Formation by the end of 1984. GASCO completed a $150 million project at Bu Hasa during the year to improve the efficiency of the gas extraction system there. Subsequently all three GASCO extraction systems, at Bu Hasa, Asab, and Bab, were operating at gas extraction efficiencies of approximately 97%. DUGAS completed a $140 million expansion project on its gas-gathering and processing system during the year, with the production capacity of the Jebel Ali liquefaction plant increased approximately 35%. Coming on-stream in April 1980, GASCO's system was capable of gathering and processing 100 mmcf/d. The expansion project increased the systems' capacity to 250 mmcf/d. At the end of 1984, 150 to 155 mmcf/d of gas was being processed along with a natural flow of 14,000 bbl/d of NGL. Gas processing produced 9,715 bbl/d of propane, 6,960 bbl/d of butane, and 7,000 bbl/d of condensate.

Petroleum.—Production operations in the Bundug Oilfield, which had been discontinued in October 1979 owing to reservoir pressure maintenance problems, were resumed at the beginning of 1984. Production rates for the first half of the year varied between 6,000 and 10,000 bbl/d and rose to 15,000 bbl/d by the end of the year. Production was expected to increase to 26,000 bbl/d by the end of 1986. Reactivation of the

field was the result of a secondary recovery program begun in early 1981. In 1984, to maintain the proper pressure and ratio of oil to gas produced, an average of 70,000 bbl/d of brine was injected into the field. The Bundug Oilfield straddled the offshore border between Abu Dhabi and Qatar, and production has been shared between them on a 50-50 basis. Operator of the field was the Bundug Oil Co., which was owned equally by the United Petroleum Development Co. of Japan, British Petroleum, and CFP of France.

The largest petroleum development production company in the United Arab Emirates continued to be ADCO. Owned 60% by ADNOC, the Government parastal started seven exploration-appraisal wells during 1984 and completed two others begun in 1983, for a total footage drilled of 73,666 feet. Of the seven wells started, four were completed and three were still being drilled or tested at yearend. Two of the appraisal wells were in the Arab and Sahil Fields to evaluate the Thamama reservoirs down to the Hanshan Formation. Offshore, the Hail-3 exploratory well resulted in ADCO's first significant gas discovery in the Permian Khuff Formation. The well was drilled to 18,700 feet. ADCO produced an average of 453,082 bbl/d of oil, compared with 496,622 bbl/d in 1983. The decrease in production was attributed to company-imposed quotas, and not to a loss in production capacity. The Asab and Bu Hasa Fields each produced approximately 45% of the total daily yield, with the Bab, Shah, and Sahil Fields together producing the remaining 10%. In addition, ADCO produced an average of 10,682 bbl/d of condensate from the Thamama F and C Formations. Of the total produced, approximately 25% was supplied to the Ruwais refinery, 8% was sent to the Umm al-Nar refinery, and the remaining 67% was exported from the Jebel Dhanna terminal.

Abu Dhabi Marine Areas Operating Co. (ADMA-OPCO) handled almost all offshore petroleum development and production operations in Abu Dhabi during 1984. ADMA-OPCO, the third largest oil producing company in the United Arab Emirates, as with ADCO, was also owned 60% by ADNOC. In the exploration area, ADMA-OPCO drilled six wells, compared with eight in 1983. The most successful was Hair Delma 3, 196 kilometers west of Abu Dhabi City, which yielded significant natural gas in the pre-Khuff Formation. Of the other wells, some yielded evidence of hydrocarbons and 2,410 kilometers of marine seismic survey indicated a number of additional exploration possibilities. In addition to the exploration work, a total of 30 oil and gas projects valued at $40 million was completed on Das Island. ADMA-OPCO reported a production of 188,500 bbl/d of crude production during 1984, a 9.7% decrease from that of 1983. All of the production came from the two offshore fields of Umm Shaif and Lower Zakum. ADMA-OPCO exports followed the general pattern of previous years, with 75% of its crude production going to Japan. Other export destinations included other Far Eastern countries, India, France, African countries, and Australia.

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[1]Physical scientist, Division of International Minerals.

[2]Financial Times (London). United Arab Emirates. Section III, Jan. 7, 1985, p. 7.

[3]Rock Products. United Arab Emirates. V. 88, No. 4, Apr. 1985, pp. 53-54.

[4]Where necessary, values have been converted from United Arab Emirate dirhams (UAED) to U.S. dollars at a rate of UAED3.67 = US$1.00.

*U.S. GOVERNMENT PRINTING OFFICE: 1986-491-457:20249